

Crop Nitrate Availability and Nitrate Leaching under Micro-Irrigation for Different Fertigation Strategies

FREP Contract # 01-0545

Project Leaders

Blaine Hanson
Department of Land, Air and Water Resources
University of California
Davis, CA

Jan W. Hopmans
Dept. of Land, Air and Water Resource
University of California
Davis CA

Objectives

1. To determine fertigation strategies for microirrigation systems using state-of-the-art modeling tools to improve water and nutrient use efficiencies and to reduce leaching of nitrates and other nutrients and chemicals;
2. To develop jointly a publication and slide show for our target audience, highlighting the recommendations using color graphics of two-dimensional simulation results to illustrate the effect of proposed fertigation strategies on the movement of nitrate for various microirrigation systems.

Description

Various fertigation strategies for microirrigation systems to improve water and nutrient use efficiencies and to reduce leaching of nitrates will be modeled to determine patterns of nitrate about drip lines. The modeling of these fertigation scenarios will be conducted using the computer simulation model, HYDRUS-2D. The model will be used to determine nitrate and water patterns, crop nitrate availability and to quantify nitrate leaching under microirrigation. Hypothetical scenarios will be developed and modeled to highlight the effects of improper water and fertigation management on water and nutrient availability, and deep percolation losses of water and nitrates. Moreover, model results will be used to develop guidelines for proper fertigation management practices.

After the modeling and evaluation of results are completed, a UC publication will be prepared to illustrate the project results, such that the effects of fertigation management on nitrate availability and leaching can be easily understood, and their adaptation becomes intuitively attractive. This is especially important, since the underlying flow and transport processes are extremely complicated and difficult to explain. This publication will include a description of the pertinent soil and crop properties and processes and their interactions, and contain colorful

illustrations of the pertinent two-dimensional patterns of water and nitrate, and guidelines on fertigation timing and duration for growers.

Results and Conclusions

Various strategies and the boundary conditions needed by the model for those strategies have been developed. The computer modeling is underway.